

REVIEWS.

- I. **THE GROSS AND MINUTE ANATOMY OF THE CENTRAL NERVOUS SYSTEM.** By H. C. GORDINIER, A.M., M.D., Professor of Physiology and of the Anatomy of the Nervous System in the Albany Medical College; Member of the American Neurological Association. With 48 full-page plates and 213 other illustrations, many of which are printed in colors, a large number being from original sources. 8vo. Philadelphia: P. Blakiston's Son & Co., 1899.
- II. **THE NERVOUS SYSTEM AND ITS CONSTITUENT NEURONS.** Designed for the Use of Practitioners of Medicine and of Students of Medicine and Psychology. By LEWELLYS F. BARKER, M.B., Tor., Associate Professor of Anatomy in the Johns Hopkins University and Assistant Resident Pathologist to the Johns Hopkins Hospital. With two colored plates and 676 illustrations. New York: D. Appleton & Co., 1899.
- III. **THE ANATOMY OF THE CENTRAL NERVOUS SYSTEM OF MAN AND OF VERTEBRATES IN GENERAL.** By LUDWIG EDINGER, M.D. Translated from the fifth German edition by WINFIELD S. HALL, Ph.D., M.D., assisted by PHILO LEON HOLLAND, M.D., and EDWARD P. CARLTON, B.S. Illustrated with 258 engravings. Philadelphia: The F. A. Davis Company, 1899.

IN spite of the enormous amount of work that has been devoted to the central nervous system in man, we are still far from any adequate knowledge of its structure and functions. This is the result of the extreme complexity of the structure and the impossibility of devising any adequate experiments which will enable us to study the functions of the sensory neurons or the way in which certain portions of the brain act upon other portions—that is to say, the functions of the endogenic neurons. Various methods of arriving at a clear understanding of the central nervous system have been devised, each of which is vaunted by its particular school, although, of course, no leader in this branch has ever been satisfied to pursue one method to the exclusion of all the others. The most obvious method is direct observation, and it was practically the only method pursued by the older anatomists, and was, moreover, the method that produced such magnificent results in the hands of Stilling. Next in course of time was the study of the effects of pathological lesions, and from this naturally arose the experimental work upon the lower animals in the attempt to elucidate some of the problems of human cerebral anatomy. At the same time it occurred to another class of students that comparison of the human brain with the brains of the lower animals, particularly if the latter were studied in the order of their development from the lowest to the

almost human type of the anthropoid apes, would yield valuable information, and finally Flechsig has added greatly to our knowledge by his method of studying the periods at which the different groups of fibres in the central nervous system assume their myelin sheaths; but all these methods give us merely an idea of the grosser features. Microscopical technique, however, has advanced so greatly with the discovery of various methods of staining that we are able nowadays to study very minutely the anatomy of the individual nerve-cells. How much has been added to the knowledge that was gained, or that could have been gained, by the old carmine stain it is useless to discuss. Even the Golgi method of impregnation, beautiful as it is and wonderful as its results have been in the hands of such masters as Golgi himself, Cajal, Kölliker, and Lenhossek, has added only a few really new things to our knowledge. That these things are of paramount importance must be admitted. The method of Nissl, in spite of the elaborate terminology that its inventor has devised, has added but little to our knowledge of the normal anatomy of the cells, for the tigroid bodies can be seen with hæmatoxylin, and the outlines of the cell are shown no more clearly than with carmine. The revelation of more minute features is claimed for the complicated methods of Apathy and for the as yet unpublished method of Bethe. To these methods we owe our modern conception of the neuron theory, especially to that of Golgi. According to this theory, the nervous system is composed of a series of units, each of which consists of a nerve-cell, its dendritic or branching processes, and its axis-cylinder—also a branching process, but somewhat different in character. The cell is usually an irregular or round body containing a nucleus, a nucleolus, and in the protoplasm of some of these cells there are small masses of granules that take the basic aniline stains. The dendritic processes usually branch freely, becoming smaller and terminating in a fine network of fibres provided with little lateral buds or gemmules, which do not, however, as far as we have been able to determine, come in contact with any part of any other neuron. The axis-cylinder is a long, slender process of equal calibre throughout that gives off from time to time yet more slender lateral processes—the collaterals—and that terminates in various ways, either in a fine tuft of fibres that are placed in close relation to the protoplasmic processes of another cell, or in some special peripheral sensory area, or in a muscle plate. We know something of the apparent function of these three elements. The axis-cylinder is certainly a path for the conduction of nervous impulses from the ganglion cell to its termination; the cell body probably generates these impulses or modifies others that it receives, maintaining at the same time a trophic influence over the whole neuron, so that when it is destroyed its processes degenerate. In some of the lower animals it is possible that the neurofil, or network of dendrites and collaterals, is capable of an existence independent of the presence of the ganglion cell. Regarding the functions of the dendritic processes, we are at present in doubt. According to some authors, particularly Lenhossek, they are cellulipetal organs conveying impulses from their peripheral terminations to the cell—a theory that is favored by the presence near their terminations of the terminal fibrilla of the axis-cylinder that forms part of their chain. Lenhossek even believes that certain nerve fibres conveying impulses to the ganglion cells of the spinal cord are nothing but modified dendritic processes. Other writers, however, chiefly be-

cause of their resemblance in form to the branches or roots of a tree, have supposed that they have a nutritive function and represent merely a mechanical extension of the protoplasm of the cell, so that it becomes capable of presenting a greater surface to the nutritive fluids that surround it. In favor of this view is the fact that the substance of the dendritic processes, at least of the main trunks, is very similar in structure and staining reactions to the substance of the protoplasm of the cell itself, and, further, that frequently a particularly stout protoplasmic process can be seen extending from the cell to some adjacent blood-vessel. Now, the central nervous system is, as a matter of fact, composed practically of nothing but these neurons embedded in a mass of fibrous connective tissue that is derived from the epithelial layers of the embryo, and is called neuroglia. It has been found that, in general, neurons having the same functions or influences over certain local areas in the body are placed close together—that is, in groups or bundles. It has been customary, therefore, in studying the anatomy of the nervous system, to regard it as made up of groups of ganglion cells, or, as they are commonly and confusingly termed, nuclei, which are composed of the cellular elements of neurons with similar functions, and of bundles of nerve fibres or tracts which are composed of the axis-cylinders that proceed from these nuclei to the point where the impulses that they generate are supposed to act. The nuclei are aggregations of cells and can usually be studied directly—that is, they occur in groups, and all the cells in these groups can readily be stained. The presence, however, of numerous nuclei close together, or their overlapping, often renders it difficult to determine the limits of each one. The course of the fibres is traced with more difficulty, and various methods have been resorted to for the detection of the situations of these tracts and their termination. Of these, three methods are most important: First, direct observation, certain bands of fibres being separated from their surroundings and recognized as such without, or sometimes with, preparation; second, the study of degenerated fibres, staining recent degenerations by the Marchi method, those of older date by the Weigert method; and third, the method of Flechsig, or the study of the embryonal development of the fibres. We have at least learned from these that the neurons are arranged in chains, thus, in the motor tract one neuron passes from the cortex to the spinal cord, and where it terminates another passes out along the peripheral nerves to a muscle in the sensory chain. The sensory fibre passes from the periphery to the ganglion cell, which also sends out a fibre that enters the spinal cord, and comes into relation either there or in the medulla with the secondary neurons, which also terminate in all likelihood in the basal ganglia, where the third neuron conveys the impulse to the cortex. As direct contact has not certainly been observed, various theories have been suggested to explain how the nervous impulse passes from the termination of the axis-cylinder of one neuron to the ganglion cell of the next in the chain. It has been supposed that the dendritic processes are capable of movement, and that they form actual contact with the fibres from the axis-cylinder, or that without direct contact an impulse may be set up in one cell by the activity of the nervous impulse in another by a sort of induction. A difficulty of this theory, which does not seem to have occurred to most of its advocates, is that supposing we admit the neuron to be an independent unit, there is no route provided for the return of the nervous impulse to the cell

that generated it, unless we can imagine it passing back up the axicylinder—a movement that there is no reason to believe occurs. Apapthy, whose results have been more or less accepted by Bethe and Nissl, has found by special methods of staining, minute fibrils in the nerve cell, that pass out by the protoplasmic processes and into other nerve cells, thus forming contact throughout the entire nervous system. His work, however, on account of the extreme complexity of the methods employed, has not as yet been sufficiently confirmed. At any rate, the transmission of impulses from one neuron to another certainly does occur, and it makes little difference, as far as the functional result is concerned, just how it is brought about.

Until very recently the anatomy of the central nervous system was neglected by systematic general writers, and the English reader was driven to translations from the German or to text-books of anatomy. It is true that in one of these text-books (Quain's) the article written by Schaeffer is quite equal in excellence to anything that has been done in any other language, but no separate book existed. This deficiency has been overcome recently.

Gordinier has provided a most excellent practical work, profusely illustrated with plates and inserted figures. The book professes to be merely a text-book of the subject, written primarily for the student and adapted to his needs. It commences, therefore, as is customary in such books, with a description of the histology of the nervous system, then takes up the spinal cord, the cerebellum, and the various regions of the brain. The work concludes with a description of the histology of the cortex, the course as far as known of the fibres in the centrum ovale, and has chapters on the bloodvessels, on cerebral localization, on the embryology of the brain, and on the macroscopical and microscopical technique. The book does not pretend to contain any strikingly original matter, but does aim to present what is known on the subject clearly and logically. In this we believe the author has fairly succeeded: the style is lucid, the illustrations are well chosen, and in general well printed. There are certain features of the book that we perhaps are not altogether unjustified in pointing out. We think the book is larger than is necessary, and this excessive size is due to the large type, generously leaded, that is employed for the text. It is not really easier to read large type than reasonably small type that is clear, and this makes the book heavier and more clumsy. Many parts could have been printed in small type without any impairment to the value of the book, and this would also have served to reduce the size, particularly those parts relating to microscopical and post-mortem technique. Another factor that is not altogether praiseworthy is the repetition of plates with separate numbers. Of course, as a matter of fact, there are forty-eight plates in the book, but they are by no means all different. These, after all, are all very minor matters. A more serious fault is the almost total neglect of the literature of the subject, references being introduced in the rarest instances, although the author must have known that his excellent book would find a much wider circle of readers than that bounded by the walls of the class-room.

Barker's book is an ambitious effort to present the material now accumulated concerning the anatomy of the brain and cord within the limits of a single book, and always with strict reference to the neuron

theory. The book consists of over 1100 pages, to which some plates with letter-press are appended. It is divided into various sections, profusely and excellently illustrated, and the arrangement is logical. Abundant use has been made of the literature of the subject, which has been read thoroughly and intelligently and abstracted with careful fairness. If we may be permitted to point out certain features that to us appear to be defects, possibly merely those incident to a first edition, we would like to speak first of the length of the book. It is at least twice as long as seems necessary, the style is diffuse, and some material has been introduced that is not altogether relevant to the subject, although in some instances it is quite interesting. Thus, on page 31, there is a panegyric upon Ehrlich's work, that, brief though it is, might have been omitted without injury. There are also numerous repetitions, and some things are stated as certain concerning which a few of us entertain what we believe to be as yet a not altogether unreasonable skepticism, particularly, for instance, in regard to the direct dendritic processes of the cells. Neither do we agree with Barker's conclusion that if certain anastomosis between the terminations of the axis-cylinders and the dendrites, for which no anatomical relations indicating conduction can be discovered, are assumed to have no nervous functions, then we are obliged to admit that the transference of impulses from one neuron to another may be the sum total of the nervous functions. After criticising the length it will appear ungracious, perhaps, to suggest that anything might have been added, but it would have been delightful to have had Barker describe for us in his clear manner the marginal veil theory of His, which is barely mentioned. There are two or three little defects of arrangement that we may also notice. In a few of the illustrations the letters appended to the figures are explained only in the text and not in the legend. It is our belief that this should never be the case. The table of contents, for some inexplicable reason, is divided into two parts, the second part being placed in the body of the book. There is not really sufficient distinction between the two parts to justify this, and it is more than inconvenient. The excellences of Barker's work are numerous. A more thorough review of the literature of the subject has probably never been made, and perhaps could not have been made by a man who had devoted his life to this branch or who had a theory to defend, for then his opinions could not have escaped the influence of the personal equation. Not that we mean that Barker has made no investigations of his own, for it is very evident that he has made many; but we think it just to say that the new knowledge concerning the anatomy of the central nervous system that appears in this work is practically negligible. The illustrations are often really luminous; many of them are original, and some of these are of extraordinary value, particularly the horizontal sections through the pons and medulla of a new-born babe, prepared by Dr. Hewatson. The diagrams of the relations of the nuclei in the brain, as projected upon a plane surface by Miss Sabin, are also valuable, but, of course, only to one who has worked with the actual specimens. Many of the subjects are discussed in a masterly manner. We think perhaps that the description of the structure of the posterior columns of the cord and of the course of the fibres entering by the posterior roots is one of the best features of the book, but among so many excellent features it is difficult to choose. Popular subjects, such as cerebral localization,

or the discussion of the relations of morphology to psychology are only incidentally mentioned. The neurologist will, of course, find in it much that is of value to him, but he will be obliged to search for it carefully. On the whole, America is to be congratulated for having produced what is probably the most complete work in the English language upon the anatomy of the brain.

Edinger's book is practically a new work, although it is called a fifth edition. The industrious author has introduced a second part, in which he reviews the embryology and the comparative anatomy of the vertebrate brain, studying each portion of the brain through the whole vertebrate kingdom up to man. This is the most complete and masterly treatise upon this important subject that has hitherto appeared, although, if we are to believe rumor, a more thorough work is now in course of preparation. It is hardly necessary to make any criticism of Edinger's book. It is a book not for the beginner, but for the specialist. The treatment of the subject is all technical, and the mass of information at Edinger's disposal is too vast to allow him to present a text-book for beginners. In order to keep his work within the bounds of a series of lectures he is obliged to hint at many subjects which to him are clear, but to the rest of us, unfortunately, are not so comprehensible. The book is of considerable value to the general reader, for in it are introduced discussions of various popular subjects, particularly the relation of the brain to the mind. Edinger has little hesitation in locating the highest psychic functions in the cortex of the brain. He gives a very interesting and valuable *résumé* of our knowledge of the relation of the enlargement of certain parts of the brain to certain varieties of intelligence, but reaches the lame and impotent conclusion that in regard to this subject we are still obliged to devote ourselves to the collection of data and not to the discussion of it. The translation in general is excellent. There is a slight flavor of the original German that is not altogether distasteful to those already acquainted with the language, such as the phrase "by the numerous already decussated." Occasionally a word is misused or not used according to the English idiom; thus, the spinal cord is sometimes spoken of as the "spinal marrow, now nearly obsolete." On page 127 the epiphysis is called an "impaired" organ, and although this is literally correct, we suspect that "unpaired" would have been nearer the meaning Edinger intended to convey. The book is carefully printed; the illustrations are almost equal to those in the German edition, having suffered but little in the transference. It is the smallest of these three books, and yet we cannot help feeling after perusal that it contains the greatest amount of important material. The third part shows no essential change from that of the preceding edition.

J. S.

CHIRURGIE DU RECTUM. Par E. QUÉNU et H. HARTMANN. Tome II. Tumeurs du Rectum. 8vo., pp. 384, avec 74 figures et 28 planches hors texte. Paris: G. Steinheil, 1899.

THIS handsome work is a second volume of the elaborate treatise on rectal surgery being written by the authors. The previous volume, published about five years ago, took up the consideration of the anatomy

and other preliminary matters, as well as inflammations of the rectum. This volume discusses rectal tumors, and does so in an exceedingly satisfactory manner. As would be expected, a great deal of attention is given to the histology of these morbid growths.

The microscopical illustrations, many of which are colored, are very beautiful. There are also a great many plates showing the macroscopical appearance of the varieties of rectal disease; a considerable number also of these plates are colored. More than half of the book is occupied with a consideration of rectal cancer. The various methods of removing the diseased portion of the bowel are described. The authors advocate a combined abdominal and perineal operation, by which a thorough eradication of the diseased organ is made possible.

The authors divide rectal tumors into those of epithelial type, those of connective tissue type, and those of the muscular type. They then devote a short chapter to certain growths observed in the rectum, but which they think are scarcely properly included in the category of true tumors. These are angiomas, dermoid cysts, and some teratomas. They do not consider hemorrhoidal disease as properly belonging to the group called angiomias, hence hemorrhoids are not discussed in this volume. A limited number of cases are quoted in order to illustrate the statements of the writers, but the book is not overloaded with clinical histories.

The fine paper and the excellent manner in which the printer's work has been done make the book very agreeable to the eye. The scientific value of its chapters and the bibliographical references contained in the foot-notes will give it a permanent place in surgical literature. It is destined to be frequently referred to by those interested in the surgery of the lower bowel.

J. B. R.

TRAITÉ DE CHIRURGIE CLINIQUE ET OPÉRATOIRE, publié sous la direction de MM. A. LE DENTU et PIERRE DELBET. Tome huitième. Mésentère, Pancréas, Rate, Foie et Voies Biliaires, Anus et Rectum, Rein, et Uretère, avec 123 figures. 8vo., pp. 972. Paris: J. B. Baillière et fils, 1899.

THE eighth volume of this comprehensive treatise, which will consist of ten volumes, discusses the surgical affections of the mesentery, pancreas, spleen, liver, anus, rectum, kidney, and ureter. The articles are written by Villar, Faure, Delbet, Guinard, and Albarran, and seem to be prepared with care and thoroughness. The illustrations are not very numerous for a volume of such size, and, though sufficiently demonstrative, are scarcely good enough, in an artistic sense, to be used in a work of reference of such pretensions as *Traité de Chirurgie*. Most of them are too sketchy to be considered satisfactory. They, however, show the points to which the authors desire to call attention, and perhaps that is all that is really essential in illustrations.

Due consideration seems to have been given to American operators and writers on abdominal surgery, but the spelling of their names will sometimes be found a little unfamiliar to their American colleagues.

J. B. R.